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COMBATING EFFECTS OF FALL FROSTS IN BULGARIA

Ordinarily, autumns in Bulgaria are warm and long. These favorable conditions are not constant, however. They are often affected by short-term but early and quite intensely cold weather. In such cases the country is flooded by cold wave as early as September or the beginning of October. This cold air, which ordinarily invades in fast-moving waves, is accompanied by a sharp drop in temperature and brief rainfalls which can turn to snow at high altitudes. However, soon after the influx of coal air the clouds begin to break up and the winds subside. The air becomes transparent, visibility very good, and the sky has a light greenish tinge. Consequently, conditions for strong heat radiation prevail at night, leading to the occurrence of frosts and rimes.

Since the widely diversified geography of Bulgaria affects the influx of cold air in different ways, the described phenomena do not occur in the same way in all parts of the country. Conditions for strong heat radiation during the still and clear nights are most favorable in the closed-in valleys, where the cold air that has rushed in remains the longest time. These cold waves are much less pronounced in the more exposed places, especially along the Black Sea Coast. For that reason the earliest and more intense frosts affect the plains in the valleys of western Bulgaria first and for the longest time. In the last 20 years frost precipitation has been observed at Samokov and Ikhtiman as early as the end of August, and at Velingrad, at some places in Sofia Okoliya, Radomir, and Kyustendil, even before 15 September. Up to 15 October, frosts precipitate at even lower places such as Pleven Okoliya, Turnovo Okoliya, Ruse Okoliya, Kolarovgrad Okoliya, Dobrudzha, Aytos Okoliya, Karnobat Okoliya, the plains behind the Balkan Mountains, Plovdiv Okoliya, Kurdzhali Okoliya, and even Sandanski Okoliya.

The frost are considerably less intense and less frequent along the Black Sea Coast and partly in the Danubian lowlands. Only during the second half of October do more intense and more frequent frosts occur. These cause greater damage to vegetable gardens and actually end their use.

It is a known fact that these early and untimely frosts cause great damage to the Bulgarian national economy. While with the private and individual farming of the past such losses were accepted as inevitable and unavoidable natural calamities, under present conditions of cooperative farming such an attitude does not and cannot have any justification.

It is possible to fight these harmful frosts and rimes? Such a fight is possible provided all preliminary measures are taken.

Of primary importance in this fight is timely notification that frost is to be expected. By using the achievements of meteorology and especially of the science of weather forecasting it is today fully possible to foretell the fall of frost at least 24 hours before it occurs. These are general forecasts, however, and cover the entire territory of the country. For that reason it is desirable that forecasts be given for specific localities.

When a cold wave passes a certain locality and the weather clears up soon afterward and the wind subsides, a considerable drop in temperature can be expected the following night. To determine the extent of this temperature drop certain instrumental observations of temperature trends must be made. On a clear and still night when the temperature (in the meteorological shelter, drops to 5 degrees (all degrees centigrade) after falling since evening, then a temperature close to zero can be expected close to the earth's surface. (In this case the thermometer in the meteorological shelter registers a temperature 3.5 to 5 degrees higher than that a few centimeters above the earth's surface.) If the observer has at his disposal a thermometer attached to the ground (radiation thermometer), and if the temperature drops to 2 degrees after midnight and no changes occur before morning, then the temperature will inevitably drop below zero. The sooner the temperature drops at night the greater the cold wave will be. In such cases a warning to start countermeasures must be given as soon as the temperature drops below 2 degrees.

Cold weather of this kind ordinarily lasts from 2 to 5 days and nights.

Since these supplementary observations require certain facilities (mainly instruments) and continuous vigilance during the time of danger, the establishment of a special organization should be considered. When necessary, the personnel of this organization would have to clarify and apply to its specific area the forecast of the Central Meteorological Station and give out the necessary instructions. In the Soviet Union, when there is a danger of frosts and rimes in spring and autumn, the central weather forecasting station broadcasts the applicable forecast. All meteorological stations receive the warning, reduce it to their area, and communicate it to nearby sovkhozes and kolkhozes so that they can take the necessary measures in time.

The second part of the fight against rimes and frosts consists in taking special measures. Apart from the quick picking of vegetables, which is not recommended for all cases, the more valuable plants can be covered with blankets, cardboard, straw, etc. This method can be applied only with cultures which cover very small plots of land. For the protection of larger plots of land other methods are used, such as watering the gardens, covering them with a smoke screen, and heating them. The use of the smoke screen is the oldest, the cheapest, and the most popular measure. It can be successfully applied to protect vegetable gardens from less intense cold weather. In this case it is preferable to use moist smoke from burning moist straw or leaves rather than dry smoke from burning chemicals. For this purpose five to six heaps per decare should be set up with a diameter of 1.5 to 2 meters and of the same height. They should consist chiefly of moist burning substances, such as straw, leaves, etc. To be effective, the smoke screen must be used on large plots of land. This method is effective down to 2 degrees below zero.

Substantial results can also be obtained by the use of special heaters which burn gasoline, briquettes, wood, etc. They help to raise the temperature by 2 to 3 degrees.

Since the first autumn rimes and frosts are less intense, it is possible to combat them effectively with smoke, given the proper organization and preliminary preparation, and provided the appropriate heating method is also carefully studied.

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